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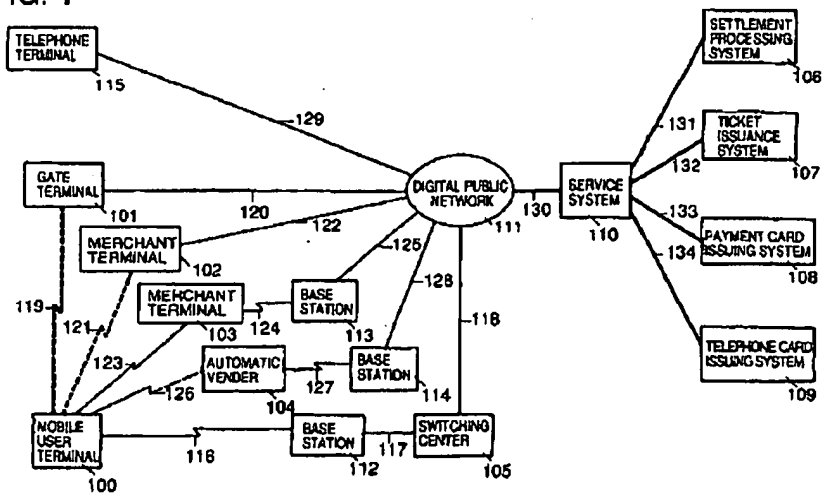
(54) MOBILE ELECTRONIC COMMERCE SYSTEM

(57) The objective of the present invention is to provide a mobile electronic commerce system that is superior in safety and usability. The mobile electronic commerce system comprises an electronic wallet 100, supply sides 101, 102, 103, 104 and 105, and a service providing means 110 that is connected by communication means. The service providing means installs a program for an electronic ticket, an electronic payment card, or an electronic telephone card. The electronic wallet employs the installed card to obtain a product or a service or entrance permission. The settlement process is performed by the electronic wallet and the supply side via the communication means, and data obtained during the settlement process are managed by being transmitted to the service providing means at a specific time. A negotiable card can be easily obtained, and when the negotiable card is used the settlement process can be quickly and precisely performed.

FIG. 1



EP 0 950 968 A1

Description

FIELD OF THE INVENTION

[0001] The present invention relates to an electronic commerce system that provides a settlement function for retail sales transactions involving the use of payment cards or credit cards (bank cards), a settlement function that provides for the employment of telephone cards for paying communication fees incurred through the use of mobile telephones, an examination function for verifying tickets issued for admission to various events, including concerts and movies, and a sales and distribution function for these payment cards, telephone cards and tickets. In particular, the present invention pertains to the maintenance of the usability and the safety of settlements, and to the facilitation of efficient and smooth business transactions.

BACKGROUND OF THE INVENTION

[0002] As the employment of telephone cards and payment cards, such as pinball game prepaid cards, has spread, prepaid systems for which magnetic cards are used to settle debts have become common. However, since there has been a corresponding increase in attendant problems, such as the illegal use of altered cards and excess charges imposed by retail shops, there is a demand that the safety of settlement systems be improved. Recently, an IC payment card has appeared that provides one countermeasure to illegal applications.

[0003] An explanation will now be given for the organization of a prepaid settlement system employing a conventional, general payment card.

[0004] In Fig. 138A is shown the organization of a prepaid settlement system using a conventional, common payment card.

[0005] In Fig. 138A, a payment card terminal 13801 is installed in a retail store 13806 and is used in the store for settlements for which payment cards are used. The payment card terminal 13801 is connected across a communication line 13804 to a central system 13802 operated by a payment card issuer 13807. At some stores, payment card terminals 13801 are connected via a POS system at the store and the communication line 13804 to the central system 13802 operated by a payment card issuer 13807.

[0006] To use a payment card to purchase a product at the retail store 13806, first, a consumer 13805 pays cash at the payment card store 13803, whereat payment cards are sold (13808), and purchases a payment card 1800 (13809). The sale of the payment card at this time is transmitted from the payment card store 13803 to the payment card issuer 13807 (13810).

[0007] Then, the consumer 13805 hands the payment card 13800 to a clerk at the retail store 13806 (13811) and requests that the payment card be used when processing the settlement.

[0008] Thereafter, the clerk inserts the payment card 13800 into the card reader of the payment card terminal 13801 and initiates the payment card settlement processing. In consequence, the payment card terminal 13801 reads current balance information from the payment card 13800, subtracts the price of the product from the available balance, and writes new balance information to the payment card. The payment card terminal 13801 also uses a printer to output a statement of account in which the price and the new payment card balance are specified.

[0009] The clerk hands the consumer 13805 the product, the payment card and the statement of account (13813 and 13812), and thus terminates the settlement processing using the payment card.

[0010] Following this, the payment card 13801 transmits the amount of the payment that was subtracted from the balance on the payment card 13800 across the communication line 13804 to the central system 13802 of the payment card issuer 13807 (13814). In response, the payment card issuer 13807 performs a transaction to transfer money to the retail store 13806 (13815).

[0011] A payment card may be purchased from an automatic vending machine that is set up to sell payment cards. Further, the same basic arrangement is employed for a payment card terminal 1380 that is constituted by an automatic vending machine and a public telephone that has a settlement function for which a payment card is used.

[0012] In addition, as is disclosed in Japanese Examined Patent Publication No. Hei 6-103426, a system is proposed wherein a payment card and a card reader/writer authenticate each other by employing a digital signature as a safety countermeasure.

[0013] Now, consider the sale and use of tickets for various events, including concerts and movies, for which prepaid settlement processing is performed in addition to that performed by using a payment card. The tickets are sold on line, while when presented, they are visually examined by ushers.

[0014] In Fig. 138B is shown the arrangement of a conventional, common ticket vending system.

[0015] In Fig. 138B, for ticket sales a ticket vending terminal 13817 is installed in a ticket retail store 13820. The ticket vending terminal 13817 is connected via a communication line 13819 to a central system 13818 for a ticket issuer 13821.

[0016] To purchase a ticket for an event, a concert or a movie, first, the consumer 13805 calls the central system 13818 of the ticket issuer 13821 and makes a reservation for a desired ticket (13824). The center system 13818 reserves the ticket applied for, and issues a reservation number to the consumer 13805 (13825).

[0017] After the reservation number is received, at a ticket retail store 13820 the consumer 13805 gives a clerk the number and asks that a ticket be issued.

[0018] To issue the ticket, the clerk inputs the reserva-

tion number at the ticket vending terminal 13817. The ticket vending terminal 13817 transmits the reservation number to the central system 13818 of the ticket issuer 13821 (13827) via the communication line 13819. In response, the center system 13818 transmits the ticket information for the reserved ticket to the ticket vending terminal 13817 (13828).

[0019] Subsequently, the ticket vending terminal 13817 prints the received ticket information on a specific pasteboard blank designated by the ticket issuer 13821, and outputs the result as a ticket 13816. The clerk then delivers the ticket 13816 to the consumer 13805 (13830) in exchange for cash (13829) and the ticket vending process is terminated.

[0020] Then, following the subtraction of its commission, the ticket retail store 13820 transmits a record of the receipts for the sale of the ticket to the ticket issuer 13821, which, in turn, subtracts its commission from the record of receipts and transmits the result to the promotor of the event for which the ticket was sold (13834).

[0021] Later, the consumer 13805 presents the ticket 13816 to an usher 13822 at an event hall 13823 (13832), and after the usher 13822 visually examines the contents of the ticket and determines that all entries are correct, the consumer 13805 is permitted to enter.

[0022] Since according to the prepaid settlement system for which a conventional payment card is employed the settlement process is primarily performed by a retail store, it is possible for a retail store to cheat a consumer when performing the settlement process by charging a higher than authorized price for a product.

[0023] In addition, in the conventional settlement system it is possible for a retail store to so alter a payment card terminal that the price charged during a settlement process is higher than is that which is displayed on a cash register or is printed on the statement of account.

[0024] Furthermore, since basically, in a conventional settlement system, the balance information held by a payment card is rewritten by the payment card terminal, the retail store may modify the payment card terminal so that the central system is charged a higher price than that which is actually subtracted from the balance recorded on the payment card.

[0025] Also, since in a conventional settlement system a payment card is loaded directly into a payment card terminal installed in a store, the retail store could modify the payment card terminal so that it alters the information stored on the card, or so that it illegally reads personal information other than that required for a settlement.

[0026] In order to prevent such an illegal modification of a payment card terminal, a physical countermeasure is required, such as the sealing of the terminal to prevent its disassembly, and this has constituted a barrier to a reduction in the size of a payment card terminal and to a reduction in the manufacturing costs.

[0027] Moreover, for a conventional settlement system, the capacity of the memory provided on a payment card is limited, and a consumer can not directly confirm an amount that has been subtracted from the payment card. Therefore, when a settlement is processed, a retail shop must deliver to a consumer a statement on which the price of a product and the remaining payment card balance is specified. This requirement constitutes a barrier to sales efficiency and to resource conservation.

[0028] According to a conventional ticket vending system, when buying a ticket a consumer must visit a ticket retail store, and this is inconvenient.

[0029] Also, as established by a conventional ticket vending system, the validation of a ticket is effected by examining the ticket visually, and such a process is not only inaccurate and inadequate but can be a contributing factor to the commission of an illegal act, such as the use of a counterfeit ticket.

[0030] Furthermore, according to the conventional ticket vending system, when a concert, for example, is canceled after a ticket is issued, to receive a refund the consumer must return to the ticket retail store, an additional inconvenient requirement.

[0031] And then, in accordance with a conventional settlement system and a conventional ticket vending system, when a consumer wishes to transfer to a friend, etc., a payment card or a ticket that has been purchased, the article must be physically delivered or mailed to the intended recipient, which constitutes one more inconvenience.

DISCLOSURE OF THE INVENTION

[0032] To resolve the above shortcomings of the conventional settlement system, it is one objective of the present invention to provide a mobile electronic commerce system that provides superior safety and usability.

[0033] According to the present invention, in a mobile electronic commerce system for paying, via wireless communication means, a required amount using an electronic wallet that includes wireless communication means, and for receiving, from a supply side, a product or a service, or a required permission, service means is provided for connecting the electronic wallet and the supply side via the communication means. The service means installs in the electronic wallet, via the communication means, a program for an electronic negotiable card. The electronic wallet employs the installed electronic negotiable card to obtain a product or a service, or a required permission, from the supply side. The settlement process using the negotiable card is performed by the electronic wallet and the supply side via the communication means. The data that are stored in the electronic wallet and at the supply side, in association with the settlement process, are transmitted to the service means at a predetermined time, and are managed by the service means.

[0034] In addition, the electronic wallet stores a pro-

ing the data structure; a clearing number 13615, which is an arbitrarily generated number that uniquely represents the clearing process performed by the transaction processing system 106; a user clearing account 13616; a request number 13617; an amount of payment 13618; a payment option code 13619; a merchant clearing account 13620; a transaction number 13621; clearing information 13622 for a service provider that is accompanied by the digital signature of the transaction processor; clearing information 13623 for a merchant that is accompanied by the digital signature of the transaction processor; clearing information 13624 for a user that is accompanied by the digital signature of the transaction processor; a transaction processor provider ID 13625; and an issued time 13626, which indicates the date on which the clearing completion notification was issued. These data are closed and addressed to the service provider, thereby providing the clearing completion notification 8417.

[2089] Upon receiving the clearing completion notification 8417, the transaction processor processor of the service providing system 110 decrypts it and examines the digital signature, and transmits a clearing completion notification 13627 to the service director processor. Upon receiving the clearing completion notification 13627, the service director processor generates a clearing completion notification 13637 for the merchant. The merchant processor closes the clearing completion notification 13637, addresses it to the merchant, and transmits it to the merchant terminal as a clearing completion notification 8418 for the merchant.

[2090] As is shown in Fig. 136C, the digital signature of a service provider is provided for data that consist of a clearing completion notification header 13631, which is header information indicating that the message is the clearing completion notification 8418 and describing the data structure; a clearing number 13632; clearing information 13623 for a merchant that is accompanied by the digital signature of the transaction processor; a customer number 13633, which is an arbitrarily generated number that uniquely represents a user for a merchant; a decrypted clearing request 13550; provided service information 13634, which concerns the process performed by the service providing system 110; a service provider ID 13635; and an issued time 13636, which indicates the date on which the clearing completion notification 8418 was issued. These data are closed and addressed to the merchant, thereby providing the clearing completion notification 8418. The provided service information 13634 is set optionally by the service provider, and may not always be set.

[2091] Upon receiving the clearing completion notification 8418, the merchant terminal decrypts it and examines the digital signature, and generates a receipt 8419 and transmits it to the merchant processor.

[2092] As is shown in Fig. 137A, the digital signature of a merchant is provided for data that consist of a receipt header 13700, which is header information indicating that the message is the receipt 8419 and describing the data structure; an item name 13701, which indicates a product that is sold; sales information 13702, which is additional information concerning the transaction transmitted by the merchant to the user; a clearing number 13703; transaction information 13704; a payment offer 8405; an accounting machine ID 13705; a merchant ID 13706; and an issued time 13707, which indicates the date on which the receipt 8419 was issued. These data are closed and addressed to the service provider, thereby providing the receipt 8419. The sales information 13702 is set optionally by the merchant, and may not always be set.

[2093] Upon receiving the receipt 8419, the merchant processor of the service providing system 110 decrypts it and examines the digital signature, and transmits a receipt 13708 to the service director processor. The service director processor employs the receipt 13708 to generate a receipt 13717 for a user. The service director processor closes the receipt 13717 and addresses it to the user, and transmits it as a receipt 8421 to the mobile user terminal 100 via digital wireless telephone communication.

[2094] As is shown in Fig. 137B, the digital signature of a service provider is provided for data that consist of a receipt header 13712, which is header information indicating that the message is the receipt 8421 and describing the data structure; a user ID 13713; a decrypted receipt 13708; clearing information 13709 for a user that is accompanied by the digital signature of the transaction processor; provided service information 13714, which concerns the process performed by the service providing system 110; a service provider ID 13715; and an issued time 13716, which indicates the date on which the receipt 8421 was issued. These data are closed and addressed to the user, thereby providing the receipt 8421. The provided service information 13713 is set optionally by the service provider, and may not always be set.

[2095] Upon receiving the receipt 8421, the mobile user terminal 100 decrypts it and examines the digital signature, and displays the contents on the LCD 303. The real credit clearing process is thereafter terminated.

[2096] In the mobile user terminal 100, the ROM 1501 and the EEPROM 1503 may be replaced by ferroelectric nonvolatile memory as a memory device for storing a program executed by the CPU 1500 and the public key of the service provider. This memory device can store data without a battery being required, while like EEPROM or flash memory, data can be written to it. In addition, the reading and writing speeds of the ferroelectric nonvolatile memory are higher than those of EEPROM and flash memory, and the power consumption is low.

[2097] When the ferroelectric nonvolatile memory is employed instead of the ROM 1501 and the EEPROM 1503, in the same manner, for example, as in the data updating process, the program for the mobile user ter-

minal 100 can be extensively updated, and the public key of the service provider can be periodically updated within a comparatively short period of time with little battery service life loss.

[2098] Furthermore, a ferroelectric nonvolatile memory may be used as the RAM 1502 to store the data that are to be processed and the data that are processed by the CPU 1500. Since data are not lost even when the battery power has been exhausted, a data backup process is not required, and the power supply required for storing the data resident in the RAM is not needed. As a result, the power consumed by the mobile user terminal can be reduced.

[2099] Also, a ferroelectric nonvolatile memory may used instead of the ROM 3001 and the EEPROM 3003 in the merchant terminal 103, or the RAM 3002. In this case, the same effects are acquired as are obtained with the mobile user terminal 100.

[2100] In the above explanation, the mobile user terminal 100, the gate terminal 101 and the merchant terminals 102 and 103, which together constitute the mobile electronic commerce system, include an optimal hardware arrangement with which to implement the individual functions needed to provide the mobile electronic commerce service. These components can be constituted by a wireless telephone communication function, an infrared communication function, and a computer that comprises a display device, a keyboard (or an input pen), a microphone and a loudspeaker, and that further comprises a bar code reader for the merchant terminal 103.

[2101] In this case, functionally corresponding hardware components of the mobile user terminal 100, the gate terminal 101, or the merchant terminal 102 or 103 are modified for inclusion in a program for the hardware components that are not included in the computer (e.g., a data codec, a cryptographic processor and a logic control unit). This program, together with a program stored in the ROM 1501 (or 2201, 2601 or 3001), is converted so that it can be operated by the OS (Operating System) of a personal computer. The resultant program is then stored at a location (e.g., on a hard disk) where it can be accessed by the computer.

[2102] A second embodiment of the present invention will now be described while referring to Figs. 139 and 140.

[2103] In the mobile electronic commerce system in the second embodiment, instead of the EEPROM 1503 an SIM (Subscriber Identify Module) card is employed for the mobile user terminal 100 in the first embodiment.

[2104] Figs. 139A and 139B are a front view and a rear view of a mobile user terminal 13900 for the second embodiment, and Fig. 140 is a block diagram illustrating the arrangement of the mobile user terminal 13900. The arrangement of the mobile user terminal 13900 is the same as that of the mobile user terminal 100, except that an SIM card 14000 and an SIM card reader/writer 14001 are provided instead of the EEPROM 1503. The external appearance of the mobile user terminal 13900 is also the same as that of the mobile user terminal 100, except that an SIM card attachment section 13901 is provided on the reverse side for attaching the SIM card 14000.

[2105] The same information as is stored in the EEPROM 1503 in the first embodiment is stored in the nonvolatile memory of the SIM card 149000: the terminal ID and the telephone number of the mobile user terminal 13900 when used as a wireless telephone terminal; a user ID; a user code number; a private key and a public key used for a digital signature; a service provider ID; the telephone number of the service providing system 110 (which is accompanied by the digital signature of the service provider); and the public key of the service provider.

[2106] The SIM card 14000 can be carried separately from the mobile user terminal 13900. But without the SIM card 14000, if it has been removed, the mobile user terminal 13900 can not be operated. When the SIM card 14000 is attached to the SIM card reader/writer 14001, the CPU 1500 of the mobile user terminal 13900 accesses the information stored on the SIM card 14000 via the SIM card reader/writer 14001 and a bus 1529. The mobile user terminal 13900 then performs the same operations as does the mobile user terminal 100 in the first embodiment.

[2107] Further, to remove the SIM card 14000 from the mobile user terminal 13900, the following operation must be performed.

[2108] First, when a user depresses the power switch and holds it down for five seconds (removal operation 1 for the SIM card 14000), the mobile user terminal 13900 displays, on the LCD 303, a dialogue message requesting confirmation that the SIM card will be removed. Then, when the user depresses the execution switch (removal operation 2 for the SIM card 14000), the mobile user terminal 13900 performs a data updating process with the service providing system 110, and uploads the data from the RAM 1502 of the mobile user terminal 13900 to the user information server 902. When the user removes the SIM card 14000 from the SIM card reader/writer 14001 (removal operation 3 for the SIM card 14000), the mobile user terminal 13900 deletes all the data held in the RAM 1502.

[2109] Specifically, when the SIM card is removed from the mobile user terminal, the data, such as those for the electronic ticket and electronic payment card, that are stored in the RAM of the mobile user terminal are uploaded to the user information server 902 of the service providing system 110.

[2110] The following operation is performed when the SIM card 14000 is attached to the mobile user terminal 13900.

[2111] When the SIM card 14000 is connected to the SIM card reader/writer 14001, the mobile user terminal 13900 displays, on the LCD 303, a screen which permits the entry of a code number. When the user enters

the code number and presses the execution switch, the code number stored in the nonvolatile memory of the SIM card 14000 is compared with the code number that was entered. When the two numbers do not match, the mobile user terminal 13900 again displays on the LCD 303 which permits the entry of the code number. When the two code numbers match, access to the SIM card 14000 is permitted. The mobile user terminal 13900 reads, from the SIM card 14000, the user ID, the private key used for the digital signature, the telephone number of the service providing system 110 and the public key of the service provider, and performs a data updating process with the service providing system 110 in order to update the data in the RAM 1502 of the mobile user terminal 13900. At this time, the data for the mobile user terminal in the user information server 902 are stored in the RAM 1502 of the mobile user terminal 13900, in accordance with the user ID stored on the SIM card 14000.

[2112] Specifically, the data for the mobile user terminal, such as the data for the electronic ticket or for the electronic payment card that are uploaded to the user information server 902 of the service providing system 110, are downloaded to the mobile user terminal to which the SIM card is attached. When, for example, an SIM card is attached to a mobile user terminal that differs from the mobile user terminal to which the SIM card was previously attached, the same data as those stored in the RAM of the mobile user terminal to which the SIM card was previously attached are stored in the RAM of the mobile user terminal to which the SIM card is currently attached.

[2113] Therefore, the user can carry the SIM card 14000 on which the user ID is stored, and can employ an arbitrary mobile user terminal as his or her own by attaching the SIM card to that mobile user terminal.

[2114] In the mobile user terminal 13900, not only the areas used for storing the user ID and the code number, but also areas that correspond to the basic program area 1700 of the RAM 1502, the service data area 1701, the user area 1702 and the temporary area 1704 may be provided for the nonvolatile memory of the SIM card 14000, so that the data stored in these areas in the RAM 1502 may be stored in the nonvolatile memory of the SIM card 14000. In this case, the data for the electronic ticket or the electronic payment card are stored in the nonvolatile memory of the SIM card 14000, and the RAM 1502 is a work area that is used by the CPU 1500 when executing a program.

[2115] Since the data stored in the RAM 1502, other than in the work area 1703 of the mobile user terminal 100 of the first embodiment, are held in the nonvolatile memory of the SIM card 14000, the data updating process, which is performed when the SIM card is attached and removed, is not required, and as a power source for holding data is also not required, the power consumed by the mobile user terminal can be reduced.

[2116] A ferroelectric memory may be used as the nonvolatile memory for the SIM card 14000. Since the reading and writing speeds of the ferroelectric nonvolatile memory are higher than are those of EEPROM and flash memory, and since the power consumption is low, the processing speed of the mobile user terminal can be increased and its power consumption can be reduced.

[2117] A third embodiment will now be described while referring to Figs. 141 to 143.

[2118] According to the third embodiment, a mobile electronic commerce system is provided that includes an IC card reader/writer and that employs, as a mobile user terminal, a portable wireless telephone terminal wherein an electronic ticket, an electronic payment card or an electronic telephone card that the user obtains is stored in an IC card loaded into the telephone terminal.

[2119] Figs. 141A and 141B are a front view and a rear view of a mobile user terminal 14100 according to the third embodiment, and Fig. 142 is a block diagram illustrating the arrangement of the mobile user terminal 14100. The external appearance of the mobile user terminal 13900 is the same as that of the mobile user terminal 100, except that an IC card insertion slot 14101 is formed in the reverse side for loading the IC card 14100. The arrangement of the mobile user terminal 14100 is the same as that of the mobile user terminal 100, except that the cryptographic processor 1505 is replaced by an IC card reader/writer 14200. When the IC card 14102 is loaded into the IC card reader/writer 14200, the mobile user terminal 14100 performs the same operations as does the mobile user terminal 100 in the first embodiment for the other devices, such as the service providing system 110, the gate terminal 101, the merchant terminals 102 and 103, the automatic vending machine 104 and the switching center 105.

[2120] It should be noted that the mobile user terminal 14100 performs the following operation when the IC card 14102 is loaded therein.

[2121] When the IC card 14102 is loaded in the IC card reader/writer 14200, the mobile user terminal 14100 displays, on the LCD 303, a screen permitting the entry of a code number. When the user enters the code number and presses the execution switch, the code number stored in the IC card 14102 is compared with the code number that was entered. When the two numbers do not match, the mobile user terminal 14100 again displays, on the LCD 303, the screen permitting the entry of a code number. When the two code numbers match, access to the IC card 14102 is permitted.

[2122] For the mobile user terminal 14100, the user ID and the user code number, the private key and the public key used for a digital signature, the service provider ID, the telephone number of the service providing system 110 and the public key of the service provider are stored in the IC card 14102, while the terminal ID and the telephone number of the mobile user terminal 14100 when used as a wireless telephone terminal are stored in the EEPROM 1503.

[2123] In addition, an additional program and the data

FIG.139A

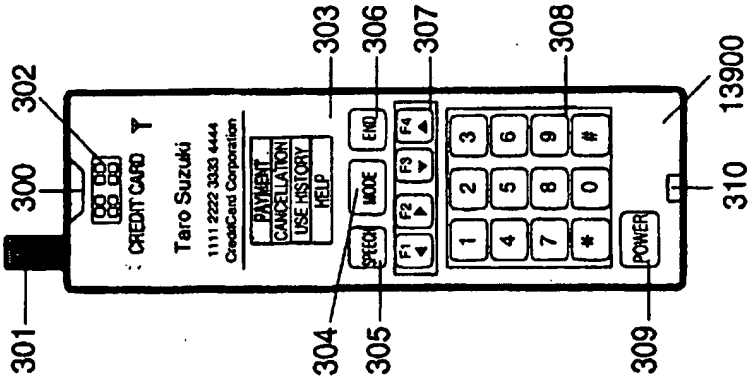


FIG.139B

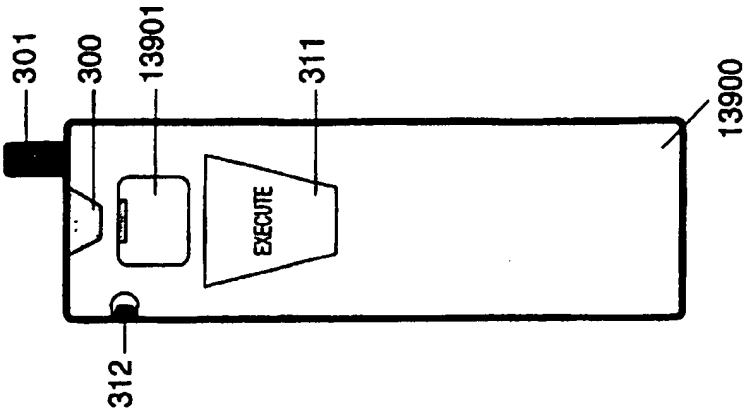
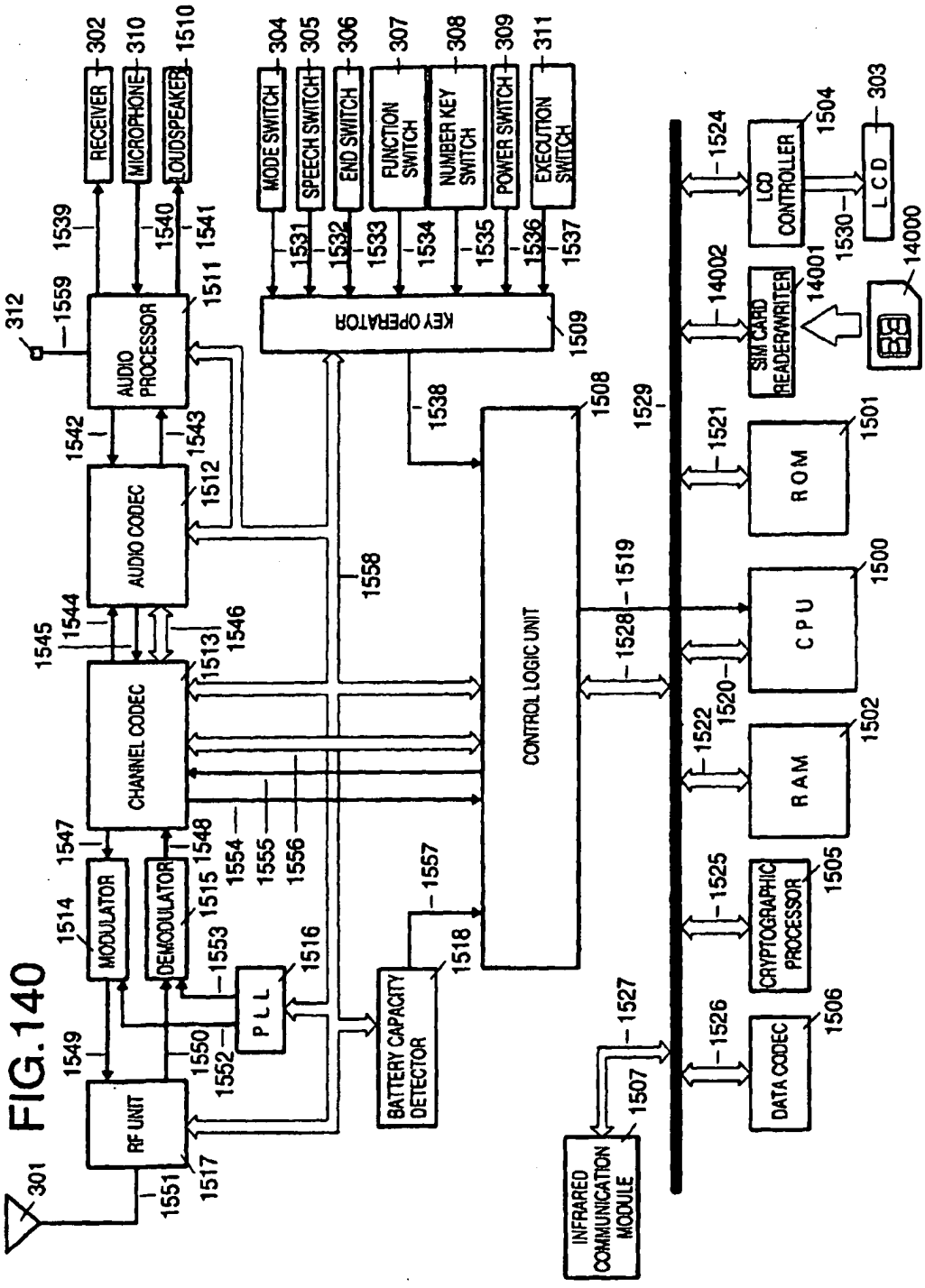


FIG.140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312
RF UNIT
MODULATOR
DEMODULATOR
CHANNEL CODEC
AUDIO CODEC
AUDIO PROCESSOR
RECEIVER
MICROPHONE
LOUDSPEAKER
KEY OPERATOR
MODE SWITCH
SPEECH SWITCH
END SWITCH
FUNCTION SWITCH
NUMBER KEY SWITCH
POWER SWITCH
EXECUTION SWITCH
CONTROL LOGIC UNIT
PLL
BATTERY CAPACITY DETECTOR
INFRARED COMMUNICATION MODULE
DATA CODEC
CRYPTOGRAPHIC PROCESSOR
RAM
CPU
ROM
SIM CARD READER/WRITER
LCD CONTROLLER
LCD
1301
1302
1303
1310
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1504
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